What we claim is:

1. A flexible scintillation-type radiation detector for use in combination with a source of nuclear radiation as a level sensing gauge, comprising:

an elongated flexible tube having first and second closed ends and defining therein a scintillation chamber;

liquid scintillation material substantially filling the scintillation chamber;

said first closed end including a substantially optically-transparent first end closure member;

photodetection circuitry operably positioned relative to the first end closure member to quantitatively detect scintillating photons generated in the scintillation liquid indicative of radiation passing into the scintillation chamber; and

an opaque, flexible protective sheath substantially surrounding the flexible tube.

2. The detector of claim 1, further comprising an expansion chamber for accommodating volumetric expansion of the liquid scintillation material.

3. The detector of claim 2, wherein a slidable piston member is operably positioned in the scintillation chamber to define a variable volume expansion chamber free of liquid scintillation material adjacent to the second end.

4. The detector of claim 3, further comprising a stiffener to maintain a portion of the scintillation chamber in which the piston slidably moves to substantially prevent bending thereof.

5. The detector of claim 3, further comprising a spring positioned to bias the piston toward the scintillation liquid.

6. The detector of claim 2, wherein the expansion chamber has a fixed volume and is in fluid communication with the scintillation chamber.

7. The detector of claim 2, wherein the expansion chamber has a variable volume, the chamber being external of and in fluid communication with the flexible tube and including a movable wall therein.

8. The detector of claim 7, further comprising a spring means positioned to bias the movable wall toward the liquid scintillation material.

9. The detector of claim 7, further comprising a member positioned to selectively immobilize the movable wall in a fixed position.

10. The detector of claim 1, further comprising a light reflector substantially surrounding the scintillation chamber and within the protective sheath.

11. The detector of claim 10, wherein the light reflector includes a flexible sheet substantially surrounding the sidewalls of the flexible tube.

12. The detector of claim 1, wherein the photodetection circuitry includes temperature sensing circuitry that compensates for a shift in the detection of scintillating photons as a result of temperature variation in the detector.

13. The detector of claim 1, wherein the flexible protective sheath is armored to resist crushing forces.